

U.S. Patent Application No. 10/820,638
Amendment dated January 9, 2008
Reply to Office Action of October 9, 2007

REMARKS/ARGUMENTS

Reconsideration and continued examination of the above-identified application are respectfully requested.

By way of this amendment, claims 1, 23-27, 51, and 53 have been amended. Full support for these amendments can be found, for instance, at paragraph [0040], as well as the claims as originally filed, for instance, the canceled claims, page 10 of the present application, and the Examples of the present application. Claims 2-4 and 22 have been canceled. Claims 28-49 have been withdrawn by the Examiner. New claims 58 and 59 have been added and support for claims 58 and 59 can be found in paragraphs [0054] and [0066], as well as the Examples, in particular Example 6 and the figure corresponding to Example 6 which shows an electrochemical cell having no more than a 2.3% capacity change after 12 continuous cycles at 133° C. Accordingly, no questions of new matter should arise and entry of this amendment is respectfully requested.

Rejection of claims 53-56 under 35 U.S.C. §112, first paragraph

At page 2 of the Office Action, the Examiner rejects claims 53-56 under 35 U.S.C. §112, first paragraph, for enablement reasons. The Examiner believes that claim 53 needs to recite that the electrolyte comprises an imidazolium or pyrazolium cation and a non-Lewis acid derived anion. This rejection is respectfully traversed.

While the present application does provide enablement for any electrolyte as disclosed in the present application, for instance, at page 10 and elsewhere, to advance prosecution of this application, claim 53 has been amended. The applicants reserve the right to pursue the original subject matter of claim 53 in one or more continuation or divisional applications. Accordingly, this rejection should be withdrawn.

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Rejection of claims 2, 27, and 51 under 35 U.S.C. §112, second paragraph

At page 3 of the Office Action, the Examiner rejects claims 2, 27, and 51 under 35 U.S.C. §112, second paragraph, for indefinite reasons. This rejection is respectfully traversed.

In response, claims 27 and 51 have been amended to further clarify the language of the claims to assist the Examiner. The scope of these claims remains the same. Claim 2 has been canceled. Accordingly, this rejection should be withdrawn.

Rejection of claims 1, 4, 5, 10, 12, 14, 21-23, 25, 26, 50, and 52 under 35 U.S.C. §102(b) – Caja et al.

At page 3 and continuing on to page 4 of the Office Action, the Examiner rejects claims 1, 4, 5, 10, 12, 14, 21-23, 25, 26, 50 and 52 under 35 U.S.C. §102(b) as being anticipated by Caja et al. (U.S. Patent No. 6,326,104). The Examiner believes that the components of these claims are shown in Caja et al., and the Examiner further asserts that the battery of Caja et al. may be used up to 300° C. This rejection is respectfully traversed.

The applicants believe that Caja et al. does not disclose electrical cell charges and discharges in the temperature range of from about 20° C to about 170° C as this phrase is understood in the present application. To assist the Examiner, the subject matter of claim 2 has been incorporated into claim 1, which further distinguishes the claimed invention from Caja et al. Accordingly, this rejection should be withdrawn.

Rejection of claims 1-8, 14-18, 22-26, and 57 under 35 U.S.C. §102(b) – Michot et al.

At page 4 of the Office Action, the Examiner rejects claims 1-8, 14-18, 22-26, and 57 under 35 U.S.C. §102(b) as being anticipated by Michot et al. (U.S. Patent No. 6,365,301). The Examiner relies on various parts of the cited reference to assert that an imidazolium cation is used in an

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electrolyte for a battery with a lithium containing anode. The Examiner believes that the cathode to anode capacity would be satisfied in this reference and, therefore, is inherently present. This rejection is respectfully traversed.

Michot et al., as shown in the Examples, has a ratio of cathode capacity/anode capacity of 0.93 and 1.09. This was calculated by:

- 1) Example 18, column 12, lines 51-52, describing an anode capacity of 2.9 mAh/cm^2 and a cathode capacity of 2.7 mAh/cm^2 – cathode capacity/anode capacity = 0.93
- 2) Example 19, column 13, lines 12-13, describing an anode capacity of 2.2 mAh/cm^2 and a cathode capacity of 2.4 mAh/cm^2 – cathode capacity/anode capacity = 1.09

The applicants wish to point out that at such a ratio, one would not achieve an electrochemical cell that has a consistent charge and discharge cycling in a temperature range of from about 20° C to about 170° C (consistent charge/discharge is a reference to cycling being tested at a temperature within 20° to 170° C and the charge/discharge being consistent at that chosen temperature realizing that the charge/discharge amount may be different for each selected temperature). To provide evidence of this assertion, the applicants direct the Examiner's attention to Example 1 of the present application, wherein an electrochemical cell with a LiCoO_2 cathode and a $\text{Li}_4\text{Ti}_5\text{O}_{12}$ anode was prepared having a ratio of 1.08 with respect to the cathode capacity/anode capacity. As can be seen in Example 1, the cycling of this cell was initially stable with cycling at 95° C , but at 142° C , the cell capacity decreased radically with cycling. The Examiner's attention is further drawn to Fig. 3, which shows this data. Clearly, this would not be a consistent charge and discharge cycling for a temperature in the temperature range recited in claim 1. Accordingly, the applicants submit that sufficient evidence has been provided to rebut the Examiner's inherency argument regarding this reference and the properties that would be present. It is clear that, based on

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the data and information present in Example 1 of the present application, Michot et al. would most likely not have the consistent charge and discharge cycling presented in the claims. Accordingly, this rejection should be withdrawn.

Rejection of claims 1-4, 50, and 51 under 35 U.S.C. §102(b) – Bonhote et al.

At page 4 of the Office Action, the Examiner rejects claims 1-4, 50, and 51 under 35 U.S.C. §102(b) as being anticipated by Bonhote et al. (U.S. Patent No. 5,683,832). The Examiner relies on various parts of Bonhote et al. and asserts that this reference shows an imidazolium cation used in an electrolyte in a battery. This rejection is respectfully traversed.

As stated above, the subject matter of claim 2 has been incorporated into claim 1 and this alone would clearly distinguish claim 1 from Bonhote et al. Furthermore, Bonhote et al. does not relate to a rechargeable battery and claim 1 further recites a rechargeable battery. Accordingly, this rejection should be withdrawn.

Rejection of claim 57 under 35 U.S.C. §103(a) – Michot et al.

At page 5 of the Office Action, the Examiner asserts that claim 57 would be obvious in view of Michot et al. because it would be obvious for one skilled in the art to have utilized a 2/1 ratio of cathode capacity to anode capacity. This rejection is respectfully traversed.

In response, there is no teaching or suggestion of increasing the capacity to at least 2 as proposed by the Examiner. Certainly, Michot et al. does not recognize the importance of the capacity of cathode to anode ratio and the results that would be achieved. As shown in the present application and with reference to Example 1 of the present application, it would not have been expected that by adjusting the capacity of the cathode to anode ratio, one could obtain an

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electrochemical cell having a consistent charge and discharge cycle with a broad temperature range. This is not shown in Michot et al., and further Michot et al. actually shows, at the ratio set forth in the Examples of Michot et al., that one would not obtain consistent charge and discharge cycling in a broad temperature range. Thus, Michot et al. would not teach or even suggest the cathode capacity to anode capacity range recited in the claims, nor would it render such a capacity range obvious, especially since the information in Michot et al. would teach the opposite. Accordingly, this rejection should be withdrawn.

Claim 53

The applicants further note that claim 53 has not been rejected in any rejection. However, the applicants believe that the subject matter of claim 53 would be patentable for the reasons set forth above.

CONCLUSION

In view of the foregoing remarks, the applicant respectfully requests the reconsideration of this application and the timely allowance of the pending claims.

If there are any fees due in connection with the filing of this response, please charge the fees to our Deposit Account No. 50-0925. If a fee is required for an extension of time under 37 C.F.R. § 1.136 not accounted for above, such extension is requested and should also be charged to said Deposit Account.

Respectfully submitted,



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